

Preliminary Amendment

| | |
|-----------------------|-------------------|
| Serial No. | Unknown |
| Int'l Application No. | PCT/GB2003/003245 |
| Filing Date | Filed Herewith |
| Int'l Filing Date | July 21, 2003 |
| Examiner | Unknown |
| Attorney Docket No. | 142.018US01 |

Title: METHOD AND APPARATUS FOR INVESTIGATING HISTOLOGY OF EPITHELIAL TISSUE Page 3 of 8

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Original) A method for monitoring the presence of selected chromophores in a sample of epithelial tissue, independent of the amount of a predetermined chromophore, the method comprising:

illuminating an area of tissue by projecting light from a light source of at least two different wavelengths λ_1 , λ_2 ;

receiving light remitted by the illuminated area of tissue at a photoreceptor; analysing the received light to obtain a measurement $R_i(\lambda)$ for each wavelength and then calculating:

$$Z = \frac{R_i(\lambda_1)}{R_i(\lambda_2)^l} \text{ where } l \text{ is chosen such that } Z \text{ is independent of the amount of}$$

predetermined chromophore.

2. (Original) A method according to claim 1, in which $R_i(\lambda)$ is calculated by analysing the received light to identify and measure the proportion of light of each wavelength remitted from the tissue $I_r(\lambda)$; and calculating the ratio of light at each wavelength returned from the tissue $R_i(\lambda)$.

3. (Currently amended) A method according to claim 1 or 2, in which l is calculated

Preliminary Amendment

| | |
|-----------------------|-------------------|
| Serial No. | Unknown |
| Int'l Application No. | PCT/GB2003/003245 |
| Filing Date | Filed Herewith |
| Int'l Filing Date | July 21, 2003 |
| Examiner | Unknown |
| Attorney Docket No. | 142.018US01 |

Title: METHOD AND APPARATUS FOR INVESTIGATING HISTOLOGY OF EPITHELIAL TISSUE Page 4 of 8

such that

$$Z = \frac{R_i(c, h, \lambda_1)^j}{R_i(c, h, \lambda_2)^{jk}} = \frac{R_i(\lambda_1)^j}{R_i(\lambda_2)^{jk}} = \frac{R_i(\lambda_1)}{R_i(\lambda_2)^j} \text{ where } j \text{ and } k \text{ are such that:}$$

$2j\alpha(\lambda_1) = 2kj\alpha(\lambda_2) = 1$ where $\alpha(\lambda_1)$ and $\alpha(\lambda_2)$ are the absorbtion coefficients for the predetermined chromophore at each wavelength.

4. (Currently amended) A method according to ~~any one of the preceding claims~~ claim 1, in which the predetermined chromophore is melanin.

5. (Currently amended) A method according to ~~any one of claims 1 to 4~~ claim 1, in which the predetermined chromophore is haemoglobin.

6. (Currently amended) A method according to ~~any one of the preceding claims~~ claim 1, in which the epithelial tissue is skin.

7. (Currently amended) A method according to ~~any one of the preceding claims~~ claim 1, in which the wavelengths λ_1 , λ_2 are chosen such that a change in collagen level causes a relatively small change in the absorbtion of λ_1 , and a relatively large change in the absorbtion of λ_2 .

8. (Original) A method according to claim 7, in which the difference between the two

Preliminary Amendment

| | |
|-----------------------|-------------------|
| Serial No. | Unknown |
| Int'l Application No. | PCT/GB2003/003245 |
| Filing Date | Filed Herewith |
| Int'l Filing Date | July 21, 2003 |
| Examiner | Unknown |
| Attorney Docket No. | 142.018US01 |

Title: METHOD AND APPARATUS FOR INVESTIGATING HISTOLOGY OF EPITHELIAL TISSUE Page 5 of 8

wavelengths λ_1 , λ_2 is at least 200 nm.

9. (Original) A method according to claim 8, in which the wavelengths are substantially 700 nm and 940nm respectively.

10. (Original) A method of forming an image of an area of epithelial tissue independent of the amount of a predetermined chromophore in the tissue, locations, formed by obtaining Z for a plurality of locations within the area, Z being obtained by illuminating an area of tissue by projecting light from a light source of at least two different wavelengths λ_1 , λ_2 ;
receiving light remitted by the illuminated area of tissue at a photoreceptor;
analysing the received light to analysing the received light to obtain a measurement $R_i(\lambda)$ for each wavelength and then calculating:

$$Z = \frac{R_i(\lambda_1)}{R_i(\lambda_2)^l} \text{ where } l \text{ is chosen such that } Z \text{ is independent of the amount of}$$

predetermined chromophore; and mapping the amounts Z at positions indicative of the location within the area of the measurement.

11. (Original) A method according to claim 10, in which $R_i(\lambda)$ is calculated by analysing the received light to identify and measure the proportion of light of each wavelength remitted from the tissue $I_r(\lambda)$; and calculating the ratio of light at each

Preliminary Amendment

Serial No. Unknown
Int'l Application No. PCT/GB2003/003245
Filing Date Filed Herewith
Int'l Filing Date July 21, 2003
Examiner Unknown
Attorney Docket No. 142.018US01

Title: METHOD AND APPARATUS FOR INVESTIGATING HISTOLOGY OF EPITHELIAL TISSUE Page 6 of 8

wavelength returned from the tissue $R_t(\lambda)$.

12. (Currently amended) A method according to claim 10 ~~or 11~~, in which l is calculated

such that $Z = \frac{R_d(c, h, \lambda_1)^j}{R_d(c, h, \lambda_2)^{jk}} = \frac{R_t(\lambda_1)^j}{R_t(\lambda_2)^{jk}} = \frac{R_t(\lambda_1)}{R_t(\lambda_1)^l}$ where j and k are such that

$2j\alpha(\lambda_1) = 2kj\alpha(\lambda_2) = 1$ where $\alpha(\lambda_1)$ and $\alpha(\lambda_2)$ are the absorbtion coefficients for the predetermined chromophore at each wavelength.

13. (Currently amended) A method according to ~~any one of the preceding claims~~ claim

10, in which the at least two sets of calculations $Z = \frac{R_t(\lambda_1)}{R_t(\lambda_2)^l}$ are carried out, a first

calculation with l , such that Z is independent of the amount of a first predetermined chromophore, and a second calculation with l_2 such that Z is independent of the amount of a second predetermined chromophore.

14. (Currently amended) A method according to ~~any one of the preceding claims~~ claim

10 in which the light source used to illuminate the tissue, is of at least three wavelengths, $\lambda_1, \lambda_2, \lambda_3$ and at least three pairs of calculations of Z are made,

namely $Z = \frac{R_t(\lambda_1)}{R_t(\lambda_2)^{l_1}}, Z = \frac{R_t(\lambda_2)}{R_t(\lambda_3)^{l_2}}, Z = \frac{R_t(\lambda_1)}{R_t(\lambda_3)^{l_3}}$ where l_1, l_2, l_3 are each chosen such

that Z is independent of the amount of the predetermined chromophore for the respective pair of wavelengths.

Preliminary Amendment

| | |
|-----------------------|-------------------|
| Serial No. | Unknown |
| Int'l Application No. | PCT/GB2003/003245 |
| Filing Date | Filed Herewith |
| Int'l Filing Date | July 21, 2003 |
| Examiner | Unknown |
| Attorney Docket No. | 142.018US01 |

Title: METHOD AND APPARATUS FOR INVESTIGATING HISTOLOGY OF EPITHELIAL TISSUE Page 7 of 8

15. (Original) Apparatus for monitoring the presence of selected chromophores in a sample of epithelial tissue, independent of the amount of a predetermined chromophore comprising a light source for illuminating tissue with light of at least two

different wavelengths λ_1, λ_2 ;

a photoreceptor for receiving images remitted by the illuminated area of tissue at a photoreceptor; and

microprocessor means for analysing the received light to identify and measure the proportion of light of each wavelength remitted from the tissue $I_r(\lambda)$;

calculating the ratio of light at each wavelength returned from the tissue $R_l(\lambda)$, and then

calculating: $Z = \frac{R_l(\lambda_1)}{R_l(\lambda_2)^l}$ where l is chosen such that Z is independent of the amount of predetermined chromophore.

16. (Original) Apparatus according to claim 15, also comprising image creation means for receiving a plurality of values of Z , each for a specified location on the tissue, and providing a mapped image representing the value of Z at the plurality of locations on the tissue.